Montana Comprehensive Assessment System (MontCAS, Phase 2)

Criterion-Referenced Test (CRT)

Common Constructed-Response Item Release
Mathematics, Grade 10

2007

OPI

OFFICE OF PUBLIC INSTRUCTION

For information, contact Measured Progress, P.O. Box 1217, Dover, NH 03821-1217.
Printed in the United States of America.

Mathematics
Session 3 (No Calculator)

You may NOT use a calculator during this session.

73. The table below shows data from seven university libraries.

Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

Scoring Guide

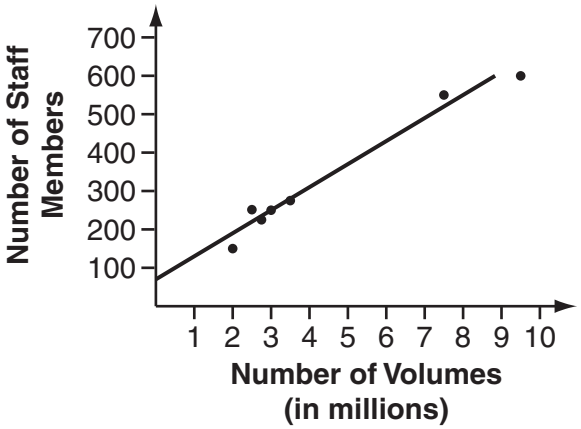
Score	Description
4	5 points
3	4 points
2	2 or 3 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Scoring Notes

Part a:	2 points	for all data points plotted correctly on correctly labeled and scaled axes
	OR	
	1 point	for 4 data points plotted correctly on correctly labeled and scaled axes or for 6 data points plotted correctly using axes with scaling errors on one or both axes or incomplete labels
Part b:	1 point	for a reasonable line of best fit
Part c:	2 points	for an answer in the range 340-390 with correct explanation or work shown or for a correct answer based on incorrect parts a and/or b with correct explanation or work shown
	OR	
	1 point	for an answer in the range with incorrect or no explanation or work shown

Sample Responses:

Parts a and b:



Part c: Looking at the line of best fit I estimated the y-coordinate that matches $x = 5$ on the line. 5 million volumes will have a staff of 360 people.

Score Point 4

Sample 1

73. The table below shows data from seven university libraries.

Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

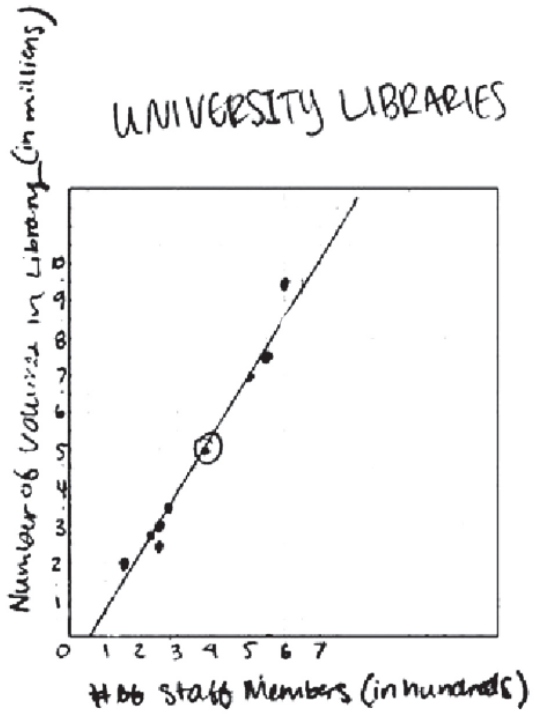
a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

a. on graph
b. on graph
C. 375 Staff Members
- went to 5 millon volumes on graph and went over til I got to the line of best fit.

5,7)



Score Point 4

Sample 2

73. The table below shows data from seven university libraries.

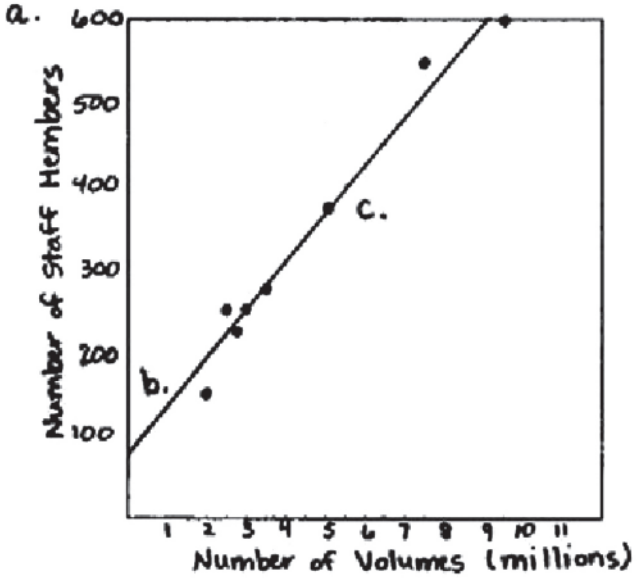
Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

c. A library with a collection of 5 million volumes needs a staff of about 375 members. I found 5 million on my line of best fit, which shows about 375.



Score Point 3

Sample 1

73. The table below shows data from seven university libraries.

Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

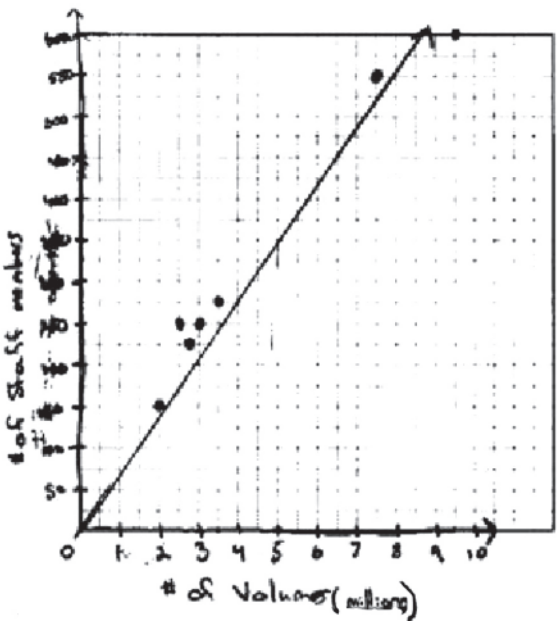
a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

c.) 360 staff members

I went to 5 million and up to where it intersected with the line.



Score Point 3

Sample 2

73. The table below shows data from seven university libraries.

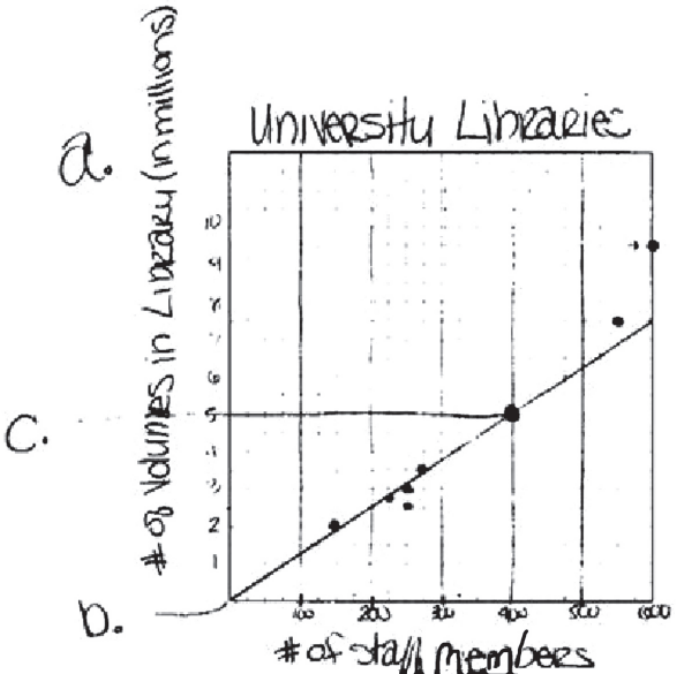
Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

a.
b.
c. 400 staff workers



Score Point 2

Sample 1

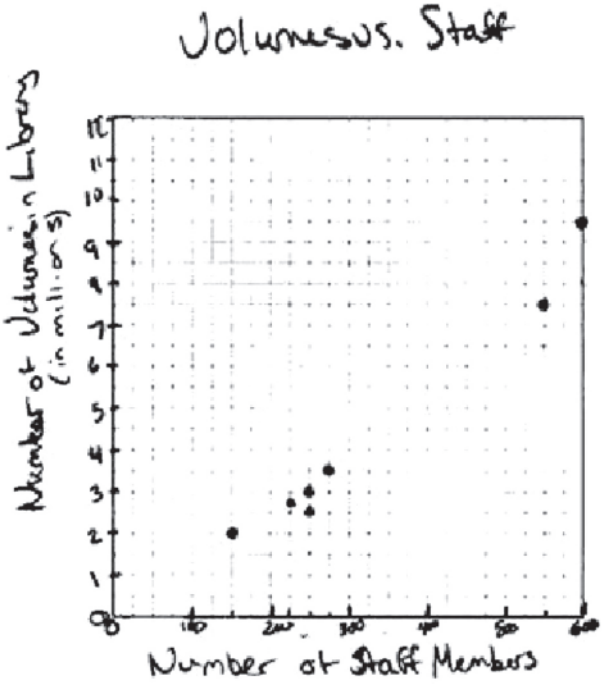
73. The table below shows data from seven university libraries.

Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.



Score Point 2

Sample 2

73. The table below shows data from seven university libraries.

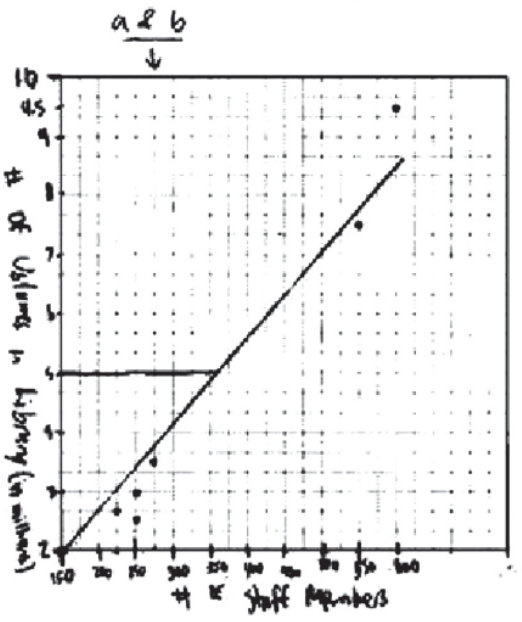
Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

c) You will need 375 staff members. I found my answer by observing the line of best fit and drawing a direct line across horizontally to where it intercepted the line. I then drew a line down vertically from the horizontal line to find where the line intercepted the # of staff members.



Score Point 1

Sample 1

73. The table below shows data from seven university libraries.

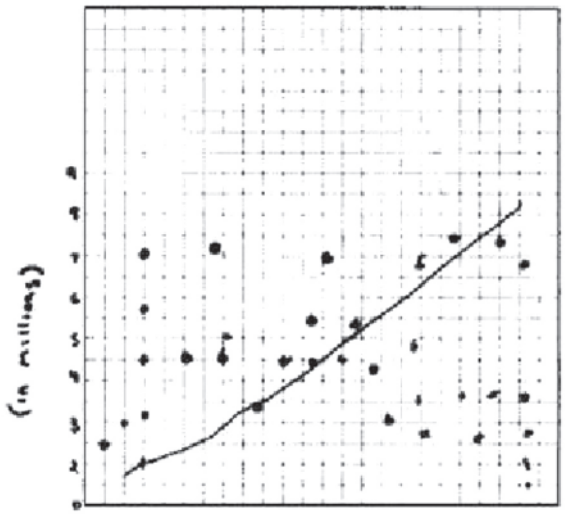
Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

c. 350 staff



Score Point 1

Sample 2

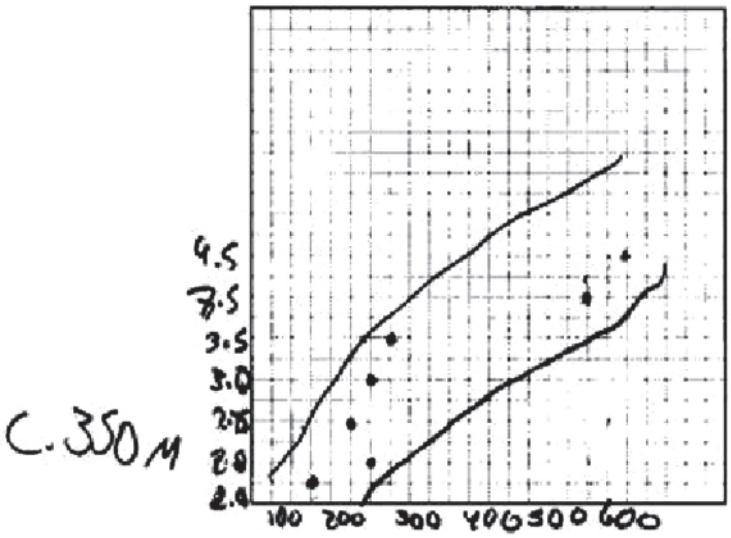
73. The table below shows data from seven university libraries.

Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.



Score Point 0

Sample 1

73. The table below shows data from seven university libraries.

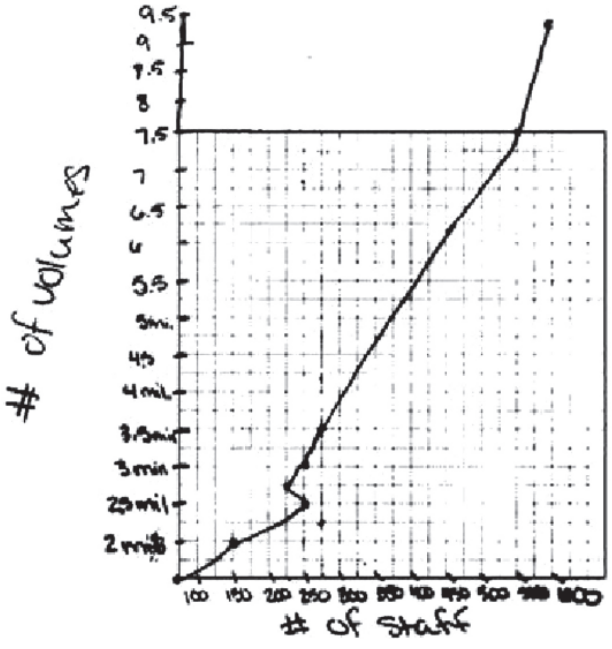
Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

c. about 400 because you add about 25 more people for each a million.



Score Point 0

Sample 2

73. The table below shows data from seven university libraries.

Number of Volumes in Library	Number of Staff Members
9.5 million	600
3.5 million	275
2.75 million	225
7.5 million	550
2 million	150
3 million	250
2.5 million	250

a. On the grid in your Student Response Booklet, construct a scatter plot showing the relationship between the number of volumes and the number of staff members in each library. Be sure to select appropriate scales and labels for the axes.

b. On the scatter plot you drew in part a, draw an estimated line of best fit for the data.

c. Based on the line of best fit you drew in part b, predict the number of staff members needed for a library with a collection of 5 million volumes. Show or explain how you found your answer.

A) 3.5 million because if you look at the scatter plot 275 are needed 5 million volumes